

## BIRDS IN A RED PINE PLANTATION

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IN recent years plantations of pine trees have been established on lands unsuited for agriculture. These trees soon form dense stands which afford good cover for birds. A casual June survey of a 28-acre red pine plantation in Michigan indicated that birds were frequenting it extensively; thus it seemed worthwhile to determine which species were using it, for what purposes, and to what extent.

The plantation is about one mile east of Pellston in Emmet County, Michigan. Its east end is about 200 feet from a stream called Maple River. Except for a few rows of jack pine (*Pinus Banksiana*) along the western border, the plantation consists of a pure stand of red pine (*Pinus resinosa*). It is divided into two parts, based upon the direction of the rows. Thirty-two rows extend in an east-west direction for about one-half mile parallel to Robinson Road (Section A) and 102 rows extend in a north-south direction for about 1,066 feet adjacent to the northwestern part of the 32 rows (Section B). See Fig. 1 for a map of the plantation and its surroundings. All the trees in the 28 acres of the plantation were planted in 1950, but for reasons that are not clear, vary in height from less than 1 meter to about 5 meters.

The so-called Pellston Flats, on which the plantation is located, are 680-700 feet above sea level and have a soil of Rubicon sand which is a minimal Podsol. Apparently the Flats were once subjected to frequent burnings in the years following the cutting of the original timber. No trees reestablished themselves. According to Gates (1930), not even aspens could survive under such conditions. A photograph taken by him in 1917 shows the area adjacent to the plantation covered primarily with Kentucky bluegrass (*Poa pratensis*), as it is today. Ground cover in the plantation consists mostly of grasses and bracken fern (*Pteridium aquilinum*).

### PROCEDURE

The entire plantation was searched systematically for birds and nests by walking slowly along the aisle between two rows while scanning each tree to the right and left from top to bottom. Each nest discovered was marked. Two complete searches were made in this manner. The first search was made from 26 June to 7 July, the second from 24 July to 7 August. On 9, 11, and 12 August I took linear measurements, removed markers, and found by chance a few more nests.

As I discovered each nest in Section A, I marked the tree in which it was built by tying a strip of cheesecloth to a branch (usually at a level somewhere below the nest). Then I walked in a perpendicular line across the rows to

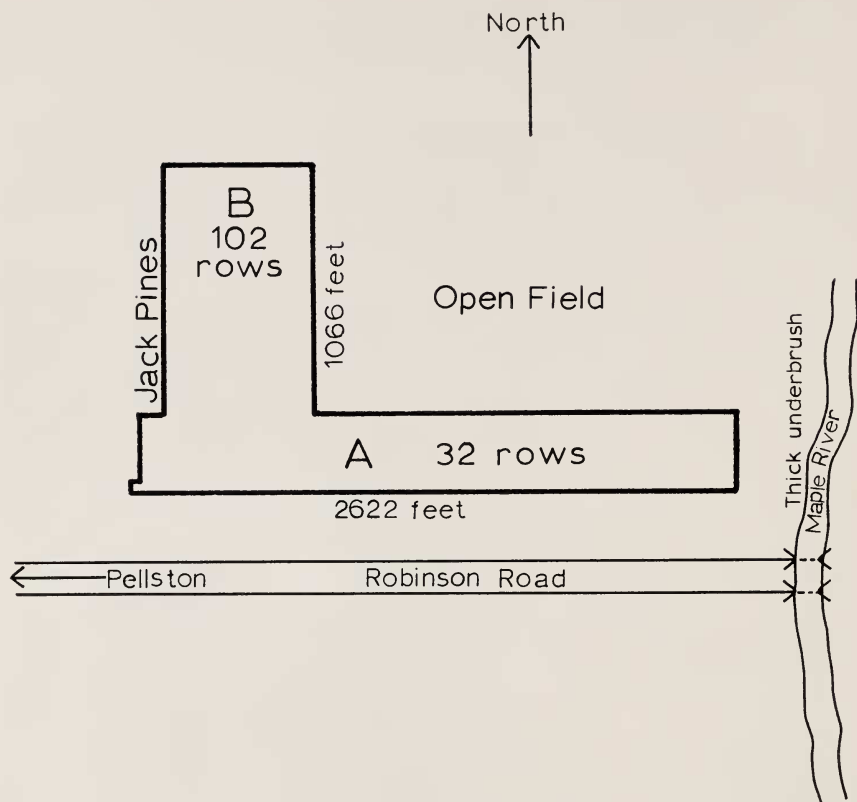


FIG. 1. Map of red pine plantation.

the row nearest the road, where another cheesecloth marker was tied to a branch. A tag was tied to this marker, and the type of nest, row number, and nest contents were written on it. The same procedure was followed in Section B except that the first tree at the south end of a row was marked to indicate that a nest was in that row.

During the second search, I measured the height of the bottom of each nest from the ground, and I also measured the height of the tree.

During these survey trips I kept records of all bird species seen in the plantation, whether they were known to be using it for nesting or not.

#### RESULTS

I found 100 nests; those remaining from previous years are not included.

Table 1 summarizes the data on these nests. The Chipping Sparrow (*Spi-zella passerina*) was the species found nesting most frequently, accounting

TABLE 1  
A SUMMARY OF NEST AND TREE HEIGHTS (IN METERS)

Species	Number	Average		Range	
		Nest height	Tree height	Nest height	Tree height
Mourning Dove	2	2.09	4.20	1.60-2.57	3.79-4.61
Black-billed Cuckoo	5	1.61	3.55	0.81-2.85	2.62-4.80
Brown Thrasher	2	0.62	1.59	0-1.24	-
Robin	8	1.52	3.55	0.62-2.15	2.88-4.30
Cedar Waxwing	27	1.94	3.66	1.27-2.80	2.42-4.60
Purple Finch	4	2.43	3.79	2.20-2.74	3.46-4.59
Chipping Sparrow	47	1.66	3.19	0.87-3.19	1.33-4.87
Clay-colored Sparrow	2	1.26	2.47	1.21-1.31	2.42-2.51

for almost one-half of the nests observed. Cedar Waxwings (*Bombycilla cedrorum*) accounted for approximately one-fourth of the nests. The remaining nests were divided among nine other species: Mourning Dove (*Zenaidura macroura*), Black-billed Cuckoo (*Coccyzus erythrophthalmus*), Yellow-shafted Flicker (*Colaptes auratus*), Eastern Kingbird (*Tyrannus tyrannus*), Brown Thrasher (*Toxostoma rufum*), Robin (*Turdus migratorius*), Purple Finch (*Carpodacus purpureus*), Clay-colored Sparrow (*Spizella pallida*), and Song Sparrow (*Melospiza melodia*). The Eastern Kingbird and the Song Sparrow are not included in the table because only one nest of each was found. The kingbird built its nest 2.32 meters up in a tree 4.07 meters high, whereas the Song Sparrow nest was on the ground under a pine tree.

Each species selected trees that were high enough to meet its usual nesting requirements (Fig. 2). The Mourning Dove, Eastern Kingbird, and Purple Finch built their nests high in the highest trees. All other species placed their nests below two meters; the Brown Thrasher and Clay-colored Sparrow were the lowest tree nesters.

A nest of the Yellow-shafted Flicker was found within the study tract but it is not included with the other nest data because it was located 1.55 meters high in a stub of a dead aspen 2.05 meters high in the midst of the plantation.

Brown-headed Cowbirds (*Molothrus ater*) must also be included with those species using the pine plantation for nesting. Their eggs were found in four Chipping Sparrow nests. To my knowledge only one juvenile cowbird fledged. The other three nests were abandoned after cowbirds laid eggs in them.

In addition to those species nesting in the pines, at least nine others used the plantation as a feeding area: American Woodcock (*Philohela minor*), Traill's or Least Flycatcher (*Empidonax* sp.), Black-capped Chickadee (*Parus atricapillus*), Yellow Warbler (*Dendroica petechia*), American Redstart (*Setophaga ruticilla*), Indigo Bunting (*Passerina cyanea*), American Goldfinch

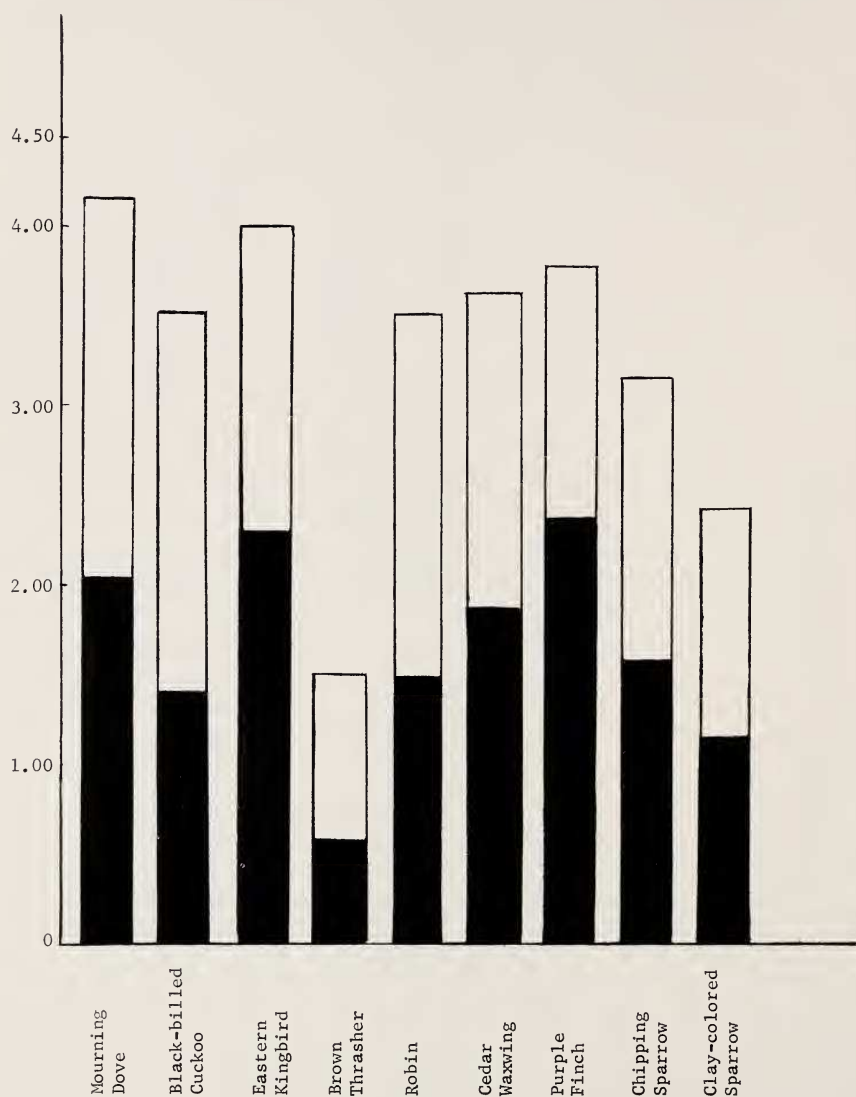


FIG. 2. Average heights of nests and trees in a red pine plantation.

(*Spinus tristis*), Rufous-sided Towhee (*Pipilo erythrophthalmus*), and Vesper Sparrow (*Pooecetes gramineus*). The last two mentioned species were seen frequently at the east side of Section B and very possibly were nesting there.

The distribution by height of all the nests and all the trees containing nests is summarized in Tables 2 and 3. The large number of Chipping Sparrow and

TABLE 2  
NUMBERS OF NESTS AT VARIOUS HEIGHTS

Tree heights (in meters)	Number of nests
4.5 to 5.00	0
4.0 to 4.49	0
3.5 to 3.99	0
3.0 to 3.49	1
2.5 to 2.99	8
2.0 to 2.49	18
1.5 to 1.99	46
1.0 to 1.49	21
0.5 to 0.99	3
0.0 to 0.49	2

Cedar Waxwing nests make the 1.50- to 1.99-meter range the most favorable. The 3.00- to 4.00-meter tree size was most frequently utilized.

It is interesting to note that all the nests, except the flicker nest and the two ground nests, were placed against the trunk of the tree, thus receiving increased protection.

DISCUSSION

It is quite evident that red pine plantations may, depending on their height and density, provide an excellent habitat for certain bird species. The pine tract studied was 11 years old and seemed to be particularly well-suited to the nesting requirements of Chipping Sparrows and Cedar Waxwings, while providing acceptable sites for some other species. The Chipping Sparrows preferred trees about 3 meters in height and usually placed their nests about

TABLE 3  
VARIOUS HEIGHTS AND NUMBERS OF TREES USED FOR NESTING

Tree heights (in meters)	Number of trees
4.5 to 5.00	6
4.0 to 4.49	9
3.5 to 3.99	28
3.0 to 3.49	32
2.5 to 2.99	14
2.0 to 2.49	6
1.5 to 1.99	0
1.0 to 1.49	2
0.5 to 0.99	0
0.0 to 0.49	2

1 to 2 meters from the ground. Cedar Waxwings placed their nests a little higher in taller trees.

Several authors have shown that "artificial" habitats attract rather high populations of birds. S. C. Kendeigh (*in* Hickey, 1937, 1938, 1939) recorded densities varying from 10.9 to 15.9 birds per acre on a country estate in Ohio. A report by W. Goodman (*in* Hickey, 1940) revealed 19.8 birds per acre on a Kansas farm. A summary of a series of American and European censuses of "island" gardens was presented by Lack (1937). Pitelka (1942) reported 23 breeding birds per acre in an isolated beach village in California. Young (1949) studied a 5-acre park in Wisconsin and found a total nest density of 32.8 per acre. My study area supported 7.1 breeding birds per acre. This lower density compared to the above figures can be explained on the basis of two facts. (1) The pine plantation was not an "island" habitat in the sense of being an isolated unit, because suitable nesting sites were available to all the breeding birds in adjacent areas. (2) Large parts of the plantation were not preferred by these birds because the tree growth was rather uniform and dense, almost to the point of being impenetrable. Several of the species are "edge" birds which prefer to nest near open areas, a situation certainly not extant in the interior parts of either section of this plantation, except in the eastern part of Section A. However, it is noteworthy that although several of these nesters are "edge" birds, they did not necessarily choose sites near the edge of the plantation. Nests were found in every row of Section A and in every part of it, although as mentioned below, not with equal frequency throughout the tract.

The matter of nest height has been of interest to other authors, such as Preston (1946), who plotted the heights of nests of Brewer's Blackbird (*Euphagus cyanocephalus*), Catbird (*Dumetella carolinensis*), and Robin. Preston and Norris (1947) analyzed the nesting heights of a number of species of birds in a woods and grassland area of 90 acres in Pennsylvania. They concluded that birds prefer to nest on or near the ground, a habit which hearkens back to their reptilian ancestry, but are forced to higher sites by "disturbances" on the ground. This is especially true in suburban areas where disturbances are very great because of prowling cats and other human-associated creatures. Wooded areas relatively free from such disturbances in the form of predators yield more nests at or near ground level. Three nests of a red squirrel (*Tamiasciurus hudsonicus*) were the only evidence of a predator in the study plantation and it seems quite likely that some of the bird nests were destroyed by this animal.

Averill (1922) presented a "law" relating the height of the nest to wing length minus tail length. He notes for instance, that the Chipping Sparrow is the longest-winged sparrow and it nests a few feet up, while other, shorter-



TABLE 4  
PREFERRED NESTING HEIGHTS OF BIRDS (IN METERS)

Species	Preferred heights	Authority	Nest height in pine plantation
Mourning Dove	0-3.05	Chapman (1932)	1.60-2.57
	1.22-6.42	Preston and Norris (1947)	
Black-billed Cuckoo	2.76-3.05	Preston and Norris (1947)	0.81-2.85
Eastern Kingbird	4.58-7.64	Chapman (1932)	2.32
Brown Thrasher	0.00-2.44	Preston and Norris (1947)	0.00-1.24
Robin	1.53-9.15	Chapman (1932)	0.63-2.15
	0.61-9.15	Preston and Norris (1947)	
	3.66-7.03	Brackbill (1950)	
Cedar Waxwing	1.53-6.10	Chapman (1932)	1.27-2.80
	1.83-3.36	Preston and Norris (1947)	
	2.43-7.90	Lea (1942)	
Chipping Sparrow	1.53-6.10	Chapman (1932)	0.87-3.19
	0.30-0.91	Preston and Norris (1947)	
Song Sparrow	ground and bushes	Chapman (1932)	ground
	0.00-2.44	Preston and Norris (1947)	
	0.91-1.83	Brackbill (1950)	

winged sparrows prefer the ground or low shrubs for locating their nests. I found only two nests on the ground, but there may have been others.

A few authors have recorded the heights of nests of the species found nesting in the pines. They are listed in Table 4 with a comparison to my figures.

It can be seen that the birds nesting in this "artificial" pine habitat found nesting sites to their liking at heights comparable to those of birds nesting in more natural situations. The only significant exception is the Eastern Kingbird, which built its nest at a height lower than that given by Chapman (1932). However, I have observed this bird nesting at heights lower than Chapman's.

By dividing the plantation into 500-foot sectors, I found certain other factors evident. Thirty nests were located in the sector at the east end of Section A. Here the trees were about 3 meters high, not closely arranged (there were a number of small open areas scattered throughout this sector), and it was nearer water, all of which provided good cover and an abundant food supply. In the middle sectors the trees were uniformly above 4 meters high with branches intermingled, hence quite dense and difficult to penetrate. Nests were sparsely distributed in these sectors. The western sector of Section A provided considerable edge, but was far from water and its attendant benefits, so it was only moderately favorable as a nesting area.

In Section B, east side, the trees were less than 2 meters high and widely separated by scattered aspen clumps. This sector was the least favorable situation for nesting according to my findings. In the western half of Section B the trees were 4 meters or more high (at least in the part used for nesting), but the lower branches were not so densely intermingled as in the middle of Section A, so more birds used it.

We may therefore conclude that the most favorable situation for birds in a red pine plantation is one which has trees 3-4 meters high and not densely planted, contains scattered openings within the plot, and is located relatively near water. This is a situation favored by the "edge" birds noted in this study.

Worthy of note is that no birds used Row 32 on the field side, only two used Row 1 on the road side of Section A, and no birds used the outside rows of Section B for nesting sites. Evidently a "buffer" row or more next to their nest is preferred by most birds.

It is probably reasonable to conclude that this tract will not be used for many more years by the Brown Thrasher and Clay-colored Sparrow, which prefer to nest on or near the ground. As the trees grow taller they will become unsuited to the needs of these birds. The lowest branches will die, thus decreasing their value in providing cover for the low nesters, not to mention the increase in density of the higher branches. The Clay-colored Sparrow will be especially affected because it prefers to nest in shrubs in relatively open areas. The discovery of only two nests of each of these birds, as compared to the large number of Chipping Sparrow and Cedar Waxwing nests, is strong evidence that the area is already unfavorable to them. On the other hand, the area may become more favorable to high nesters, such as the Purple Finch, as the trees grow taller.

#### SUMMARY

A red pine plantation in northern Michigan was surveyed for birds' nests. This 11-year-old plantation yielded 100 nests of 11 species; Chipping Sparrows and Cedar Waxwings were the most abundant. These birds preferred parts of the tract where the trees were about 3 meters high and relatively open.

Nine other species were noted feeding in the plantation. The only known predator was a red squirrel, which probably destroyed some eggs.

It is concluded that a red pine plantation provides a very suitable habitat for birds.

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